

New species and notes on the genus *Cliffortia* (Rosaceae)

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ABSTRACT

Seven new species of *Cliffortia* L. endemic to the Cape Floristic Region (CFR) are described, *C. anthospermoides*, *C. cruciata*, *C. ferricola*, *C. gracillima*, *C. perpendicularis*, *C. sparsa* and *C. weimarckii*. A further species from the Graaff-Reinet area, described by Weimarck but not formally named, is here given the name *C. bolusii*. New varieties *C. cuneata* var. *cylindrica* and *C. filifolia* var. *arenaria* are also described, and *C. gracilis* Harv. is recombined as *C. dentata* var. *gracilis*. *Cliffortia discolor* Weim. and *C. hermaphroditica* Weim. are reduced to synonyms of *C. odorata* L.f. and *C. juniperina* L.f. respectively. There are now 132 species recognized in *Cliffortia*, 124 of which are found in the CFR and 109 endemic to the region.

INTRODUCTION

Cliffortia L. is one of the ten largest genera in the Cape Floristic Region (CFR) (Goldblatt & Manning 2000). In Fellingham's (2000) enumeration of the species in the CFR, 111 described species were recognized. Five other species had been described that occurred exclusively outside the CFR (Oliver & Fellingham 1994; Whitehouse 2004a), including one, *C. nitidula* (Engl.) R.E.Fr. & T.C.E.Fr. (incorporating *C. aequatorialis* R.E.Fr. & T.C.E.Fr.), found as far as Kenya (Graham 1960). Since then, eleven more species have been described (Fellingham 2003; Whitehouse 2004a, b).

In this paper, eight more species are described, as well as new varieties of *Cliffortia cuneata* Dryand. and *C. filifolia* L.f. One species, *C. gracilis* Harv., is considered to be a variety of *C. dentata* Willd., while a further two species, *C. discolor* Weim. and *C. hermaphroditica* Weim., are reduced to synonymy of more widespread species. Seven of the new species are endemic to the CFR, but the eighth species is only known from the Nardouwsberg on the Great Escarpment east of Graaff-Reinet. This brings the total number of species in the genus *Cliffortia* to 132.

The following species were listed as endemic to the CFR by Fellingham (2000), but have collections from outside the region: *Cliffortia amplexistipula* Schltr. (Namaqualand, Fellingham 1993), *C. erectisepala* Weim. (Grahamstown, Whitehouse 2004a), *C. eriocephalina* Cham. (Graaff-Reinet, see *C. bolusii* Diels ex C.Whitehouse below, and Amatole Mtns, Phillipson 1987), *C. graminea* L.f. (Grahamstown, Weimarck 1934), *C. ilicifolia* L. (Grahamstown, Weimarck 1934), *C. montana* Weim. (see *C. bolusii* below and Graaff-Reinet, Weimarck 1934) and *C. ruscifolia* L. (Namaqualand, Weimarck 1934). The presence of *C. juniperina* L.f. north of Nieuwoudtville is doubtful, whereas *C. repens* Schltr. is regarded now as being found only outside the CFR (Whitehouse 2004a). Therefore, the total number

of species found within the CFR is 124, of which 109 are endemic to the area.

1. *Cliffortia anthospermoides* Fellingham, sp. nov., *C. ramosissimae* Schltr. affinis, sed internodiis brevibus, brachyblastis imbricatis, staminibus 9–12 notabilis.

TYPE.—Western Cape, 3419 (Caledon): Caledon District, Walker Bay area, Grootbos Private Nature Reserve, slight northern slope, 150 m, (–CB), 31 Aug. 1996, *Fellingham 1691* (BOL, holo.!, K!, NBG!, PRE!).

C. sp. 2 sensu Fellingham: 614 (2000).

Medium, erect shrub, up to 1 m high, monoecious but with alternating male and female phases; young branches reddish with indumentum of long white hair, turning greyish brown, becoming glabrous, hair bases remaining as pustules, bark splitting and peeling, ageing to a smooth glabrous reddish brown surface with persistent patent, woody sheaths of fallen leaves with central nerves prominent, giving appearance of thorny petioles; internodes ± 10 mm long, shorter than leaves, giving plant a leafy appearance. *Leaves* trifoliolate; leaflets 5.5–7.0 \times 0.9–1.0 mm, straight to falcate to twisted giving an untidy appearance; margins scabrid to minutely denticulate; lamina bright green, glabrous adaxially, with occasional long hairs on margin and abaxially; sheath 1–2 mm long below central leaflet, diminishing distally, glabrous except for a few long cilia on margins, 3-nerved, medially herbaceous, laterally pinky white membranous; stipules represented by the membranous edges of sheaths forming rectangular 'wings'. *Flowers* solitary, ebracteate, in axils of vegetative leaves separated by long internodes. *Male flowers:* bracteoles ovate-lanceolate, 2.2 \times 1.5 mm, glabrous, scarious, whitish; pedicel and receptacle 1 mm long, glabrous; sepals 3 (or 4), linear-lanceolate, 3.7–4.3 \times 2.6–3.0 mm, green with occasional maroon longitudinal lines, prominently mucronate even in bud, adaxially with obvious locking mechanism consisting of subapical tuft of crisped papillae; stamens (9)10–12; filaments 5 mm long, maroon, glabrous; anthers 0.7–0.8 mm long, maroon-red with white connective. *Female flowers:* bracteoles ovate-lanceolate, 3.4–3.6 \times 2.0–2.3 mm, membranous, translucent, sheathing fruit, inner bracteole with apical one fifth part reflexed, outer with a tuft of retrorse hair at base; pedicel absent up to 0.6 mm long in fruit, glabrous; sepals 3, broadly elliptic, 1.9–2.0

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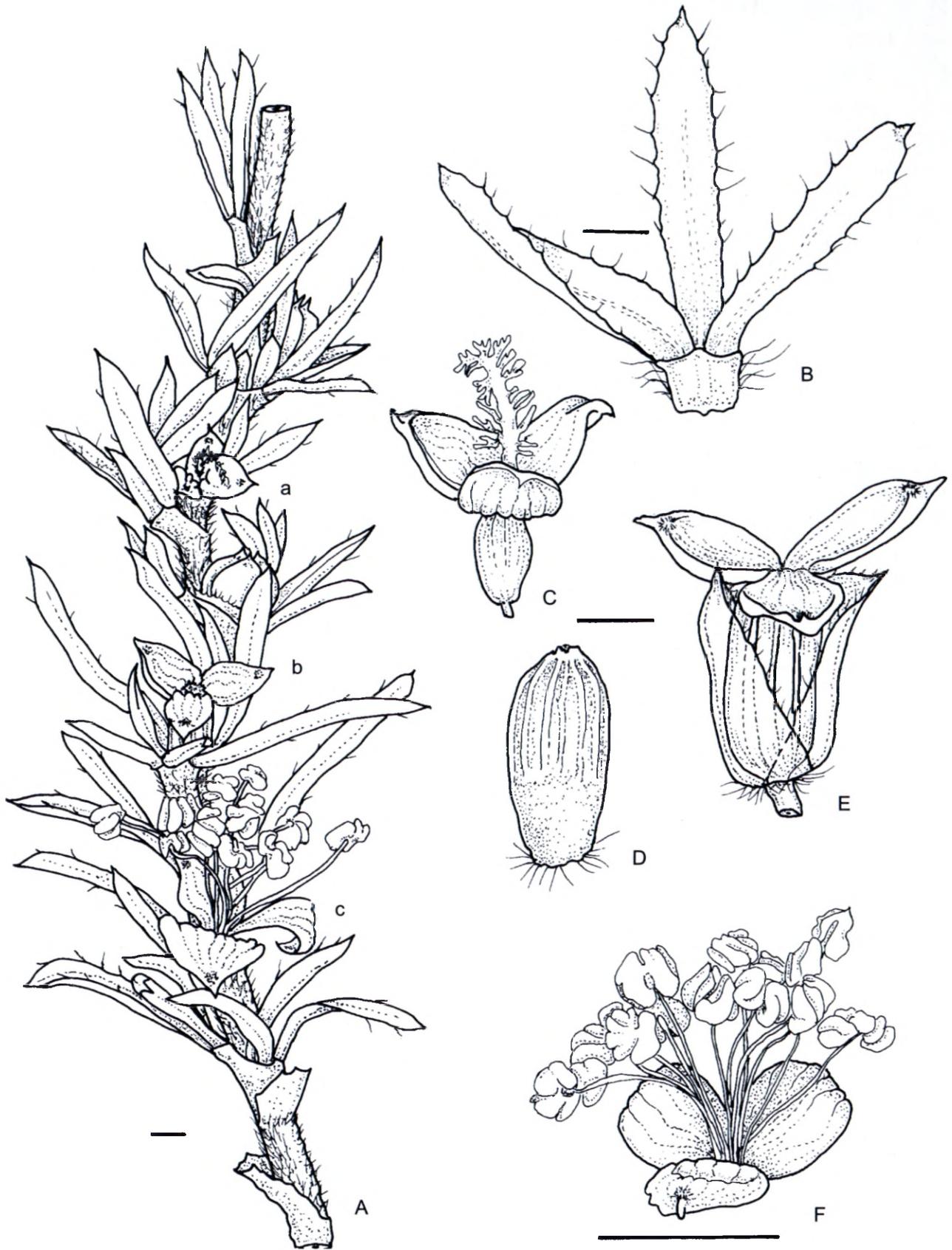


FIGURE 1.—*Cliffortia anthospermoides*. A, branch: Aa, female flower in situ; Ab, fruit in situ; Ac, male flower in situ. B, leaf; C, female flower; D, fruit; E, fruit with sepals and bracts in situ; F, male flower; A, D, E, Fellingham 1545; B, C, Fellingham 1529; F, Fellingham 1634. Scale bars: A–E, 1 mm; F, 3 mm. Artist: A.C. Fellingham.

× 1.5–1.6 mm, spreading, mucronate, glabrous but for papillate locking mechanism ventrally near apex, fugacious; immature receptacle ellipsoid, 1.5 mm × 0.8 mm, pale green with occasional longitudinal reddish lines; style solitary, 0.2–0.3 mm, pale green, glabrous; stigma 1.8–2.2 mm long, deep maroon-red, fimbriate. *Achene* ellipsoid, 1.9–2.1 × 1.5–1.6 mm, apex with small indentation containing staminodes and ridged by remains of fallen sepals, apical two thirds with ± 12 low longitudinal ridges, green, tinged with maroon where exposed to sun, lower third smooth, base concave with central pedicel scar surrounded by a ring of stiff hairs. Figure 1.

Diagnostic characters and affinities: at first sight, this species can be mistaken for a member of the genus *Anthospermum* (Rubiaceae). However, on closer examination the alternate arrangement of shoots becomes evident. Morphologically it appears closest to *Cliffortia ramosissima* Schltr. but the habit of that species is lower and spreading, not upright as in *C. anthospermoides*. Furthermore, the leaves of *C. anthospermoides* are larger and more tightly packed on the stems and the species generally has more stamens in the male flowers: 9–12, as opposed to *C. ramosissima*, which has fewer than nine. The distributions of the two species do not overlap.

Superficially the flowers appear to be borne singly in the axils of normal vegetative leaves, particularly those at the top of shoots. On closer inspection of the implantation sites of these flowers, however, the presence of a growth point next to each flower has been noted. Furthermore, the axils of leaves lower down on the vegetative shoots contained well-developed short shoots, bearing the bracts of a lower (fallen) flower as well as a second developing flower above them. From the size of the empty bracts it can be deduced that these subtended a female flower, whereas the second flower was male. Axils in the intermediate zone contained fruits in the lower bracts with very young male flowers above, whereas the axils in the tops of the shoots contained young male flowers. From the emerging pattern of male and female flower sites, it can be deduced that the first flowers of the season to appear on any particular plant, would be female. As a result of their diminutive size and obscure arrangement, these would go unnoticed except for the showy red styles. The shedding of the styles completely obscures the female phase, whereas the male phase which follows is patently obvious by its showy stamens, thus leading a casual observer to the erroneous conclusion that the plant is a male specimen of a dioecious species.

Habitat: fynbos on brown, sandy soil on slight slopes; altitude 50–250 m.

Distribution: only known from the Gansbaai area, Caledon District (Figure 2).

Conservation status: four populations are known. The population at Woest Arabie has been ± destroyed by road widening, the one at Danger Point is under threat of development and the one at Wortelgat has been severely invaded by *Acacia cyclops*; only the population in the Grootbos Nature Reserve is protected.

Etymology: an early Elsie Esterhuysen collection was annotated by her as having 'the aspect of *Anthospermum*

aethiopicum'; an apt description as the tightly packed leaves obscure the alternate arrangement of the leaves which would distinguish it from an *Anthospermum*.

2. *Cliffortia cruciata* C.Whitehouse, sp. nov., *C. ramosissima* Schltr. primo aspectu similis, sed nullis petiolis, sepalis quatuor, costis acheniorum manifeste quatuor differt.

TYPE.—Western Cape, 3319 (Worcester): Worcester District, Jonaskop, Wildepaardeberg, just below sandy plateau, 900 m, (–DC), 15 Sept. 2000, *Whitehouse 137* (BOL, holo.!; K!, MO!, NBG!, Z!).

Low, erect shrub, up to 0.3 m high, killed by fire; densely divaricately branched, forming brachyblasts; young stems 0.6–0.9 mm wide, tinged reddish, hairy; stem hairs adpressed upwards, 0.2–0.4 mm long. *Leaves* trifoliate; leaflets linear, 2.7–3.7 × 0.4–0.6 mm, base noticeably swollen and bulbous, apex 0.1–0.2 mm long, margins rounded but slightly grooved, entire and smooth; lamina chartaceous, 0.3–0.5 mm thick, slightly curved upwards and towards stem, green with two paler stripes on each side, glabrous; sheath 0.7–1.0 mm long, abaxially glabrous, adaxially hairy; stipules 0.3–0.8 mm long, free, margins smooth; petiole absent. *Flowers* solitary at base of undifferentiated leaves; bracteoles hairy on keel, margins ciliate; sepals 4, glabrous. *Male flowers:* bracteoles 1.2–1.5 mm long; pedicel and receptacle 0.5–0.8 mm long; sepals broadly ovate, 3.4–4.4 × 1.3–2.2 mm, acute to acuminate at apex, tips not completely separating at anthesis; stamens 6 or 7; filaments 1.2–2.0 mm long, red; anthers brownish red. *Female flowers:* bracteoles 1.3–1.7 mm long, shorter than immature receptacle; sepals 0.8–1.2 × 0.2–0.4 mm, erect; carpel 1; stigma 1.4–2.6 mm long, red to pinkish, feathery, hidden within leaves; immature receptacle 1.3–2.7 × 0.6–1.1 mm, glabrous, clearly ribbed. *Achene* broadly ellipsoid, 3.8–4.7 × 1.7–2.0 mm, medium brown, glabrous; ribs 4, rounded, ± 0.6 mm wide, slightly tuberculate. *Flowering time:* around September. Figure 3.

Diagnostic characters and affinities: closely allied to *Cliffortia subsetacea* (Eckl. & Zeyh.) Diels ex Bolus & Wolley Dod, but this is only clearly discernible by examination of the achenes, which are very similar except that the ribs on *C. cruciata* are not curved. In general appearance the species looks more similar to *C. ramosissima* with its short, but comparatively broad and flat, very slightly curved leaves. Apart from the achene, the two species can be easily separated because *C. cruciata* lacks any evidence of a petiole and the flowers have four sepals and four prominently ribbed achenes.

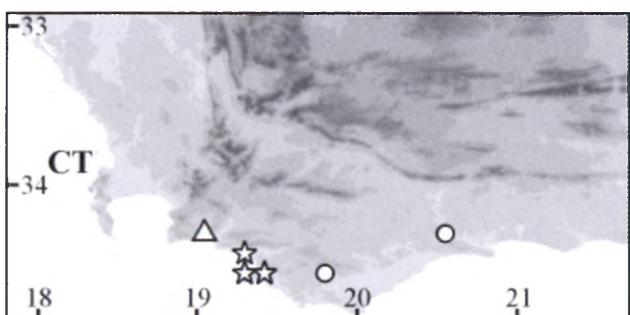


FIGURE 2.—Known distribution of *Cliffortia anthospermoides*, ☆; *C. ferricola*, Δ; and *C. perpendicularis*, ○, in South Africa.



FIGURE 3.—*Cliffortia cruciata*. A, branch with achenes, $\times 2$; B, branch with female flowers, $\times 4$; C, achene, $\times 10$.

Habitat: fynbos in full sun, on well-drained soils on deep sandy plateau; acid sands from Table Mountain Series; altitude 900–1 000 m.

Distribution: a very narrow endemic restricted to the sandy plateau of the Wildepaardeberg on the northern slopes of Jonaskop in the Riviersonderend Mtns (Figure 4).

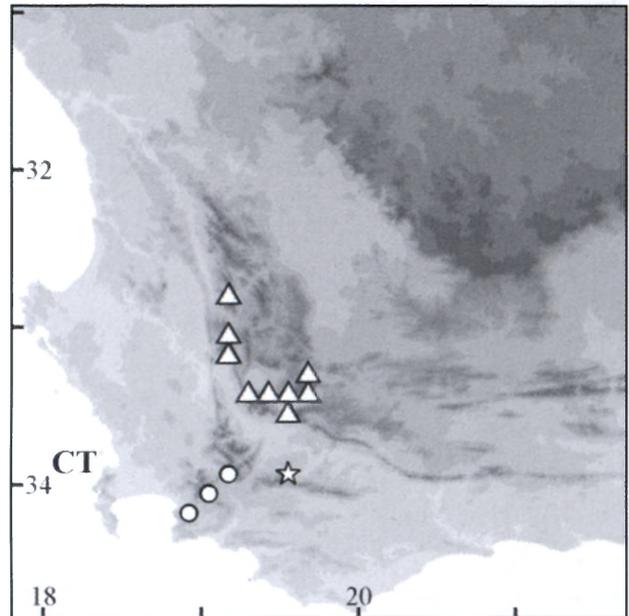


FIGURE 4.—Known distribution of *Cliffortia cruciata*, ☆; *C. sparsa*, ○; and *C. weimarckii*, Δ, in South Africa.

Conservation status: very narrow endemic, only known from a very particular habitat on a single mountain, although relatively inaccessible, it could be threatened by over-frequent fires.

Etymology: *cruciata*, Latin for crosswise, referring to the shape that the four prominent ribs of the achene make when viewed in cross section.

3. *Cliffortia ferricola* C.Whitehouse, sp. nov., ex affinitate *C. ruscifoliae* L. et specierum affinium, sed foliis saepissime profunde bilobis vel trilobis distinguenda.

TYPE.—Western Cape, 3419 (Caledon): Caledon District Kogelberg, S slopes of Mt Horeb, Kleinmond-Highlands road, 200 m, (–AC), 27 Sept. 2000, Whitehouse 145 (BOL, holo.!, NBG!).

C. versiformis C.Whitehouse (2003), manuscript name.

Medium, erect shrub, up to 1.5 m high, resprouting after fire and spreading clonally; densely divaricately branched, forming brachyblasts; young stems 1.2–1.7 mm wide, tinged reddish, hairy; stem hairs adpressed upwards, 0.2–0.7 mm long. *Leaves* usually unifoliate and deeply toothed, but occasionally bifoliate or trifoliate; leaflets broadly ovate to lanceolate, 5.3–10.0 \times 1.7–3.5 mm, apex sharply acuminate to pungent, 0.7–1.5 mm long, margins turned upwards to rounded, smooth and entire or more frequently with 2 teeth becoming deeply 3-lobed, lobes 0.6–4.9 mm long, straight; lamina 4–7-veined from base, cartilaginous, 0.3–0.4 mm thick, midrib prominent abaxially against lamina, curved downwards and away from stem, glabrous adaxially, hairy abaxially on very young growth but soon becoming glabrous, hairs 0.3–0.7 mm long; sheath 1.0–1.8 mm long, abaxially glabrous, adaxially scattered adpressed hairs; stipules 0.7–1.3 mm long, free, margins smooth to ciliate; petiole absent. *Flowers* solitary in axil of undifferentiated leaves; bracteoles hairy on keel with margins ciliate or not; sepals 3, hairy abaxially. *Male*

flowers: bracteoles 4.0–4.6 mm long; pedicel and receptacle 1.1–1.4 mm long; sepals broadly ovate, 6.4–6.8 × 2.2–3.0 mm, acute to acuminate at apex; stamens 9 or 10; filaments 8.8–10.1 mm long, red; anthers brownish red. *Female flowers*: bracteoles 3.1–4.4 mm long, longer than immature receptacle; sepals ovate, 3.2–4.1 × 0.8–1.3 mm, recurved; carpel 1; stigma 6.7–8.7 mm long, red, feathery, prominent above leaves; immature receptacle 2.4–2.9 × 0.9–1.2 mm, glabrous, clearly ribbed. *Achene* narrowly ellipsoid and slightly curved, 3.5–4.8 × 1.2–1.5 mm, medium to dark brown, glabrous; ribs 9–13, rounded to acute, 0.1–0.2 mm wide; elaiosome swollen around base. *Flowering time*: September–February, possibly sporadically all year. Figure 5.

Diagnostic characters and affinities: *Cliffortia ferricola* is clearly closely related to the very common and widespread *C. ruscifolia*, but has smaller leaflets, which are often deeply divided, sometimes almost into two or three leaflets. The habit is also characteristic, often forming erect, strongly ascending stems so that the plants are narrowly columnar. Plants are more frequently monoecious than *C. ruscifolia*.

Habitat: well-drained, clayish soil of ferricretes from shale bands of Table Mountain Series or from Bokkeveld Series, in full sun; altitude 150–250 m.



FIGURE 5.—*Cliffortia ferricola*. A, branch with female flowers, × 2; B, leaf, × 4; C, female flower, × 4; D, achene, × 6.

Distribution: restricted to ferricretes in the Bot River Valley between Houwhoek, Kleinmond and Hermanus (Figure 2).

Conservation status: known from only a few localities in a small area, one of which is near a highway junction and under threat of development.

Etymology: *ferricola*, Latin for dweller on iron, referring to the habitat of this species on ferricrete-derived soils. The name was suggested by Nick Helme, who has found this species in several localities around the Bot River growing on ferricrete.

4. *Cliffortia dentata* Willd., Species plantarum 2, edn 4: 842 (1806); DC.: 596 (1825); Harv.: 299 (1862); Weim.: 20, fig. 1A–F (1934); Levyns: 445 (1950); Fellingham: 612 (2000). Type: Cape of Good Hope, without further information (B-W, holo.).

Low, sprawling or trailing, semi-herbaceous shrub up to 0.7 m high, killed by fire; densely divaricately branched, only forming long branches; young stems 0.3–0.7 mm wide, hairy; stem hairs adpressed downwards, 0.2–1.1 mm long. *Leaves* trifoliate; leaflets obovate, 4.2–10.3 × 2.3–6.4 mm, apex acute to rounded, up to 0.4 mm long, margins flat except for apices which are sometimes recurved, with up to 5 lobes or teeth; outer leaflets often narrower than middle one and sometimes untoothed; lamina herbaceous, midrib slightly prominent abaxially against lamina, curved upwards and towards stem, glabrous; sheath 0.4–0.9 mm long, abaxially hairy, adaxially with a fringe of long straight hairs; stipules 1.9–4.0 mm long, partially joined on reverse side of stem, margins ciliate; petiole absent. *Flowers* solitary in axil of undifferentiated leaves; bracteoles glabrous on keel, margins ciliate; sepals 4, glabrous. *Male flowers*: bracteoles 1.6–2.3 mm long; pedicel and receptacle glabrous; sepals broadly ovate, 3.5–3.8 × 1.5–2.0 mm, with long attenuate apices; stamens 8; filaments 4.0–4.3 mm long, red; anthers brownish red. *Female flowers*: bracteoles 1.5–3.4 mm long, longer than immature receptacle; sepals ovate, 1.2–2.2 × 0.5–0.9 mm, strongly recurved; carpels 2; stigma 2.1–2.6 mm long, greenish white, feathery; immature receptacle 0.9–1.1 × 0.7–1.0 mm, glabrous, smooth. *Achene* slightly flattened, 2.2–2.8 × 1.0–1.2 mm, pale brown, glabrous, unribbed but with a central groove dividing two carpels. *Flowering time*: April–October, possibly as late as December.

4a. var. *dentata*

Middle leaflet 4.2–8.5 × 2.9–6.1 mm; outer leaflets, 4.3–10.3 × 2.3–5.1 mm; all leaflets 3–5-lobed or toothed, middle lobe 0.6–1.5 × 0.9–2 mm.

Habitat: shady slopes in gulleys and on damp south-facing cliffs on well-drained soils from Table Mountain Series; altitude 300–1 450 m.

Distribution: found between Wemmershoek Mtns in the north to the Helderberg and Hottentots Holland Mtns in the south, with an outlying population on the Cape Peninsula, where it is only known from the eastern slopes of the saddle between Table Mtn and Devil's Peak (Figure 6).

Conservation status: an uncommon species but its localities are well conserved and inaccessible; however, being a seeding species, too frequent fires on Devil's Peak could threaten the Cape Peninsula population.

Etymology: *dentata*, Latin for toothed, referring to the apices of the leaves that can appear like the teeth of a saw.

4b. var. **gracilis** (Harv.) C.Whitehouse, comb. et stat. nov. Type: Western Cape, 3319 (Worcester): Worcester District, Du Toit's Kloof, 610–915 m, (–CA), 1839, *Drège 145b* (K, holo.!, B†, L, S, W).

C. gracilis Harv. in *Flora capensis* 2: 299 (1862); Weim.: 22 (1934) pro parte; Fellingham: 612 (2000) pro parte.

Middle leaflet 4.5–8.4 × 4.1–6.1 mm; outer leaflets 4.7–9.5 × 3.0–6.4 mm, untoothed; middle leaflet 3(–5)-lobed or toothed, middle lobe 0.6–1 × 0.6–1.2 mm.

Diagnostic characters and affinities: *Cliffortia gracilis* was considered a distinct species by Weimarck. However, the populations in the Langeberg have consistently smaller leaves and are considerably disjunct from the Du Toit's Kloof population (the type locality). In terms of size of the leaves and flowers, the Du Toit's Kloof population falls within the range of variation shown by *C. dentata*, and only differ on the degree of dentation at the apex. Furthermore, the discovery of a population of the latter species from the Wemmershoek Mtns (*C. Whitehouse 14*), a mere 10 km or so from Du Toit's Kloof, means that the geographical distance between the populations is much smaller than previously thought. Therefore, *C. gracilis* is here reduced to varietal status and a new name, *C. gracillima* C.Whitehouse, given to the Langeberg populations.

Cliffortia dentata and *C. gracillima* form a pair of closely related species which create decumbent trailing mats on shady rocky slopes. The trifoliate, glabrous leaves, along with the general habit, distinguish this group from any other *Cliffortia*. Var. *gracilis* can be distinguished from the typical variety by the middle leaflet, which is often only 3-lobed, with the middle lobe being much narrower than the outer two, and untoothed outer leaflets.

Habitat: shady slopes in gulleys and on damp south-facing cliffs on well-drained soils from Table Mountain Series; altitude 600–1 700 m.

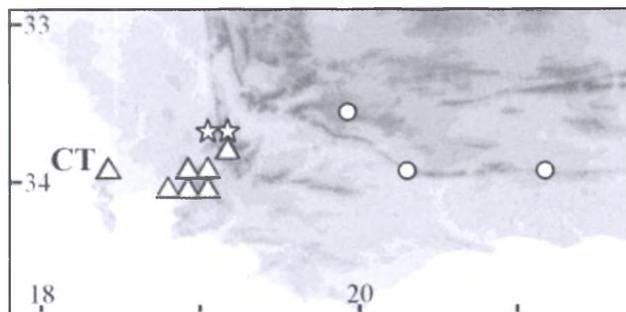


FIGURE 6.—Known distribution of *Cliffortia dentata* var. *dentata*, Δ; *C. dentata* var. *gracilis*, ☆; and *C. gracillima*, ○, in South Africa.

Distribution: only known from Molenaarsberg and Upper Wellington Sneekop to the north of Du Toit's Kloof (Figure 6).

Conservation status: only known from a small inaccessible area to the north of Du Toit's Kloof, but it could be threatened by over-frequent fires as it probably only survives as seed.

Etymology: *gracilis*, Latin for thin, slender, referring to the stems that are too weak to hold the plant upright and trail over the rocks.

5. **Cliffortia gracillima** C.Whitehouse, sp. nov., a *C. dentata* Willd. var. *gracili* (Harv.) C.Whitehouse foliis minoribus differt.

TYPE.—Western Cape, 3321 (Ladismith): Riversdale District, Garcia's Pass, 395 m, (–CC), Oct. 1904, *Bolus 11271* (BOL, holo.!, PRE!).

C. dentata sensu Muir: 56 (1929), non Willd.

C. gracilis sensu Weim.: 22 (1934) pro parte; Fellingham: 612 (2000) pro parte.

Illustration: Weim.: fig. 1G–L (1934).

Low, sprawling or trailing, semi-herbaceous shrub up to 0.3 m high, probably killed by fire; densely divaricately branched, only forming long branches; young stems 0.2–0.6 mm wide, hairy; stem hairs adpressed downwards, 0.2–0.8 mm long. *Leaves* trifoliate; middle leaflet obovate, 3.1–5.4 × 2.2–4.6 mm, apex acute to mucronate, up to 0.4 mm long, margins flat except for apices which are sometimes recurved, entire or up to 3-lobed, middle lobe much smaller and narrower than outer two, 0.4–0.9 × 0.3–1.4 mm, outer leaflets elliptic to obovate, 3.7–6.1 × 1.6–3.1 mm, almost always entire; lamina herbaceous, up to 0.1 mm thick, midrib slightly prominent abaxially against lamina, curved upwards and towards stem, glabrous; sheath 0.2–0.6 mm long, abaxially hairy, adaxially with a fringe of long straight hairs; stipules 1.6–3.1 mm long, partially joined on reverse side of stem, margins ciliate; petiole absent. *Flowers* solitary at base of undifferentiated leaves; bracteoles glabrous on keel, margins ciliate; sepals 4, glabrous. *Male flowers:* pedicel and receptacle glabrous; sepals broadly ovate with long attenuate apices; filaments red; anthers brownish red. *Female flowers:* bracteoles 1.7–3.2 mm long, longer than immature receptacle; sepals ovate, strongly recurved; carpels 2; stigma 2.6–3.2 mm long. *Achene* slightly flattened, 2.2–3.8 × 0.9–1.5 mm, pale brown, glabrous, unribbed but with a central groove dividing two carpels. *Flowering time:* July–October. Figure 7.

Diagnostic characters and affinities: previously included as part of *C. gracilis*, which is now regarded as a variety of *C. dentata*. It differs from that species by its much smaller leaves, as well as having a clear disjunction in distribution and therefore occurs in areas where summer rainfall is more common.

Habitat: shady areas in gulleys on well-drained soils from Table Mountain Series; altitude 250–1 400 m.

Distribution: known from a few localities in the Langeberg from Leeurivierberg to Garcia's Pass, with an

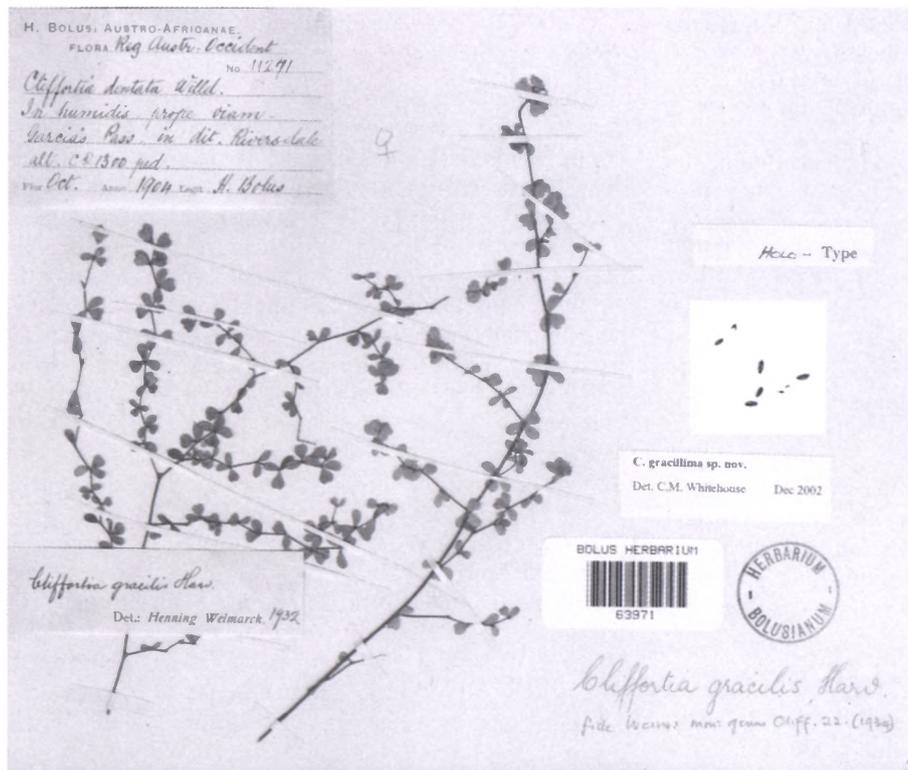


FIGURE 7.—Type specimen of *Cliffortia gracillima*.

outlying population on the Waboornsberg near Montagu (Figure 6).

Conservation status: only known from four localities but areas in between are poorly explored and it is possible that more populations occur, it grows in inaccessible areas but might be threatened by too frequent fires.

Etymology: *gracillima*, Latin for very thin and slender, referring to the stems and allusion to its previous inclusion within *C. gracilis*, from which it is much smaller in all its parts.

6. ***Cliffortia perpendicularis*** C.Whitehouse, sp. nov., ex affinitate *C. falcatae* L.f. et *C. ramosissimae* Schltr., sed ab utraque forma ramificationis distincta.

TYPE.—Western Cape, 3419 (Caledon): Bredasdorp District, Elim, Geelkop Nature Reserve, W slope of hill, 120 m, (–DB), 3 Sept. 2001, C. & A. Whitehouse 259 (BOL, holo.!: K!, NBG!).

Sprawling shrub up to 0.5 m high but often semi-prostrate, killed by fire; divaricately branched and forming brachyblasts that spread at right angles to main stem, but few long branches developing; young stems 0.9–1.6 mm wide, tinged reddish, hairy; stem hairs spreading or adpressed upwards, 0.2–0.5 mm long. *Leaves* trifoliate; leaflets oblong to linear, outer ones sickle-shaped, 3.5–7.5 × 0.7–1.1 mm, apex sharply acuminate, 0.3–0.6 mm long, margins flat, entire and smooth; lamina chartaceous, 0.2–0.5 mm thick, curved upwards and towards stem, green but with two paler stripes on either side of midrib abaxially, glabrous; sheath 1.1–2.0 mm long, abaxially glabrous, adaxially glabrous except for fringe of hairs at apex; stipules 0.8–1.5 mm long, free, margins ciliate; petiole present, 0.6–1.4 mm long. *Flowers* solitary at base of undifferentiated leaves; bracteoles short-hairy on keel, margins ciliate; sepals 3, glabrous. *Male*

flowers unknown. *Female flowers:* bracteoles 2.7–3.8 mm long, longer than immature receptacle; sepals oblong to linear, 3.5–4.5 × 0.5–1.0 mm, spreading; carpel 1; stigma 2.5–4.9 mm long, red, feathery, hidden amongst incurved leaves; immature receptacle 1.1–1.8 × 0.7–1.2 mm, sparsely and very short-hairy. *Achene* ellipsoid to cylindrical, 3.5–4.6 × 1.8–2.6 mm, medium brown but sometimes appearing greyish on account of being covered by membranous layer, glabrous or sparsely and very

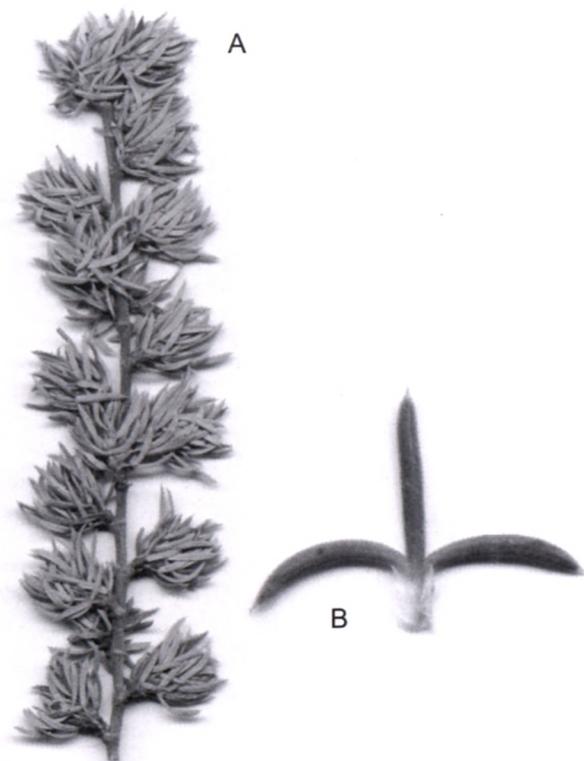


FIGURE 8.—*Cliffortia perpendicularis*. A, branch, × 1; B, leaf, × 4.

short-hairy, irregularly acutely ribbed beneath membranous layer. *Flowering time*: September. Figure 8.

Diagnostic characters and affinities: the leaves of this species appear most similar to *Cliffortia arcuata* Weim., but that species is only found on the mountains surrounding the Little Karoo. Related species that occur in the vicinity of *C. perpendicularis* include *C. ramosissima* and *C. falcata* L.f. The leaves are generally longer and more curved than *C. ramosissima* and more sharply pointed than *C. falcata*. However, the most distinctive feature about *C. perpendicularis* is the very sparse branching (excluding the brachyblasts). It has a spindly, lax habit, so much so that often only a couple of long branches exist and the main stem is unable to bear the weight of the plant, resulting in its sprawling amongst the surrounding vegetation. This is in contrast to *C. arcuata* and *C. falcata*, which have erect ascending branches, and *C. ramosissima* which has an intricate divaricate branching pattern. The distinctive branching pattern is accentuated by the brachyblasts, which appear to project from the stem at right angles.

The species is possibly of hybrid origin. In both the localities where it has been found, *C. falcata* and *C. ramosissima* are found growing within a few kilometres. However, seed is clearly viable, as the species occurs frequently in the habitats even though the plants are killed by fire; specific status is considered the most appropriate treatment for this taxon. Male flowers have not yet been found, so it is presumed that most of the reproduction by seed is apomictic and therefore asexual.

The three populations of this species appear \pm identical despite the contrasting soil types (gritty acid sands from Table Mountain sandstone on the Potberg and clayish silcretes and ferricretes over Bokkeveld shales near Elim) and they both share the unusual sprawling habit that is diagnostic for this species. Population level studies of the species would be needed to determine if they share a common ancestry or represent a case of two cryptic apomictic species derived from hybridization.

Habitat: fynbos in full sun on acid sands from Table Mountain Series or clayish soil of Bokkeveld Series; altitude 100–300 m.

Distribution: known only from three localities: two populations close to Elim and one on Potberg (Figure 2).

Conservation status: a poorly known species and only known from three very small areas, one that is threatened by agriculture and quarrying, while the others are in danger of invasion by alien vegetation.

Etymology: *perpendicularis*, Latin for at right angles, referring to the way the branches and brachyblasts appear to join the stem at right angles to it.

7. *Cliffortia sparsa* C.Whitehouse, sp. nov., planta inter *C. atratam* Weim. et *C. sericeam* Eckl. & Zeyh. aliquam intermedia sed foliis sparse pubescentibus dignoscenda.

TYPE.—Western Cape, 3419 (Caledon): Caledon District, Hottentots Holland Nature Reserve, around Nuweberg Forest Station, 560 m, (–AA), 25 Oct. 2001, Whitehouse 283 (BOL!; NBG!).

C. pterocarpa sensu Weim.: 62, fig. 16K (1934) pro parte, non (Harv.) Weim. sensu stricto.

Medium, erect shrub up to 1.2 m high, killed by fire; densely divaricately branched, forming brachyblasts; young stems 0.7–1.0 mm wide, sometimes tinged reddish, hairy; stem hairs adpressed upwards, 0.3–0.6 mm long. *Leaves* trifoliate; leaflets linear to needle-shaped, 6.0–10.1 \times 0.6–1.1 mm, apex acute to sharply acuminate, 0.2–0.4 mm long, margins flat, entire and smooth; lamina chartaceous, 0.2–0.5 mm thick, midrib prominent abaxially, \pm straight to curved downwards and away from stem, sparsely hairy adaxially and abaxially, hairs 0.1–0.6 mm long; sheath 1.2–2.1 mm long, abaxially glabrous, adaxially glabrous except for fringe of hairs at apex; stipules 1.1–2.5 mm long, free, margins smooth to serrulate; petiole absent. *Flowers* solitary in axil of undifferentiated leaves; bracteoles hairy on keel, margins serrate to very shortly ciliate; sepals 3, hairy abaxially. *Male flowers*: bracteoles 3–4 mm long; pedicel and receptacle 0.6–0.8 mm long; sepals broadly ovate, 4.8–6.0 \times 1.9–2.5 mm, acute to acuminate at apex; stamens 10 or 11; filaments 6.4–7.8 mm long, red or greenish white; anthers yellow. *Female flowers*: bracteoles 2.6–4.2 mm long, longer than immature receptacle; sepals ovate, 2.2–4.1 \times 0.9–1.5 mm, recurved; carpel 1; stigma 2.9–5.0 mm long, red to pinkish white, feathery, promi-

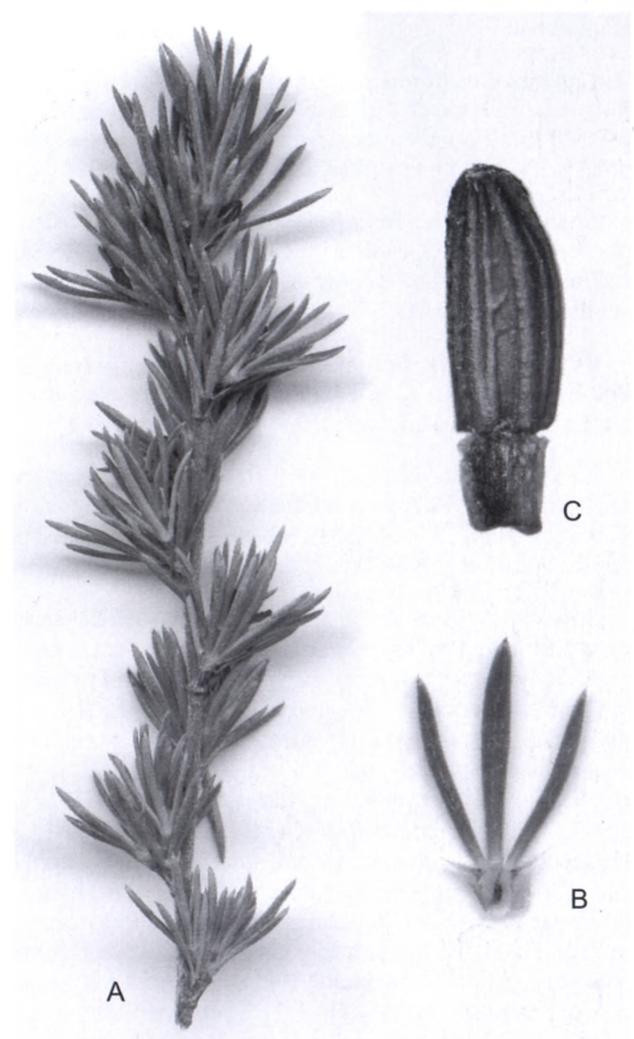


FIGURE 9.—*Cliffortia sparsa*. A, branch with achenes, $\times 2$; B, leaf, $\times 4$; C, achene, $\times 12$.

ment above leaves; immature receptacle 1.7–2.0 × 0.8–1.0 mm, glabrous, clearly ribbed. *Achene* ellipsoid, 3.5–4.1 × 1.1–1.5 mm, sometimes slightly curved, medium to dark brown, glabrous; ribs 9–12, acute, 0.1–0.3 mm wide; elaiosome swollen around base. *Flowering time*: mainly August–November, once in May. Figure 9.

Diagnostic characters and affinities: specimens of this species have in the past generally been attributed to the poorly delimited species, *Cliffortia pterocarpa*. Molecular evidence suggests, however, that this species may be of hybrid origin between *C. atrata* Weim. and *C. cristata* Weim. or *C. sericea* Eckl. & Zeyh. of section *Inflexae* (Whitehouse 2003). In many respects it is intermediate between the two putative parents, having achenes and needle-shaped leaves most similar to *C. atrata*, but having the hairs of section *Inflexae*. However, it is common where it occurs and being a reseeder is clearly able to reproduce, even if only apomictically, by seed. Male and female flowers have been found and further introgression with parent species is likely and would explain the many intermediate forms that are found.

Habitat: well-drained clayish soil from shale bands of Table Mountain Series in full sun; altitude 250–800 m.

Distribution: common along the lower slopes of the mountains from Sir Lowry's Pass to Franschoek Pass (Figure 4).

Conservation status: widespread and common through its range, often occurring in disturbed areas.

Etymology: *sparsa*, Latin for sparse, referring to the hairs on the leaves, which although appearing glabrous are in fact covered with short, sparse hairs.

8. *Cliffortia weimarckii* C.Whitehouse, sp. nov., *C. eriocephalinae* Cham. similis sed foliis longioribus angustioribus rigidioribus, apicibus acutis differt.

TYPE.—Western Cape, 3319 (Worcester): Worcester District, Matroosberg, Spekrivierskloof, stony E slopes

above Ski Hut, 1950 m, (–BC), 27 Jan. 2001, *Whitehouse 187* (BOL, holo.!; NBG!).

Erect shrub up to 0.9 m high, resprouting after fire and spreading clonally; densely divaricately branched, forming brachyblasts; young stems 1.1–1.5 mm wide, usually tinged reddish, densely hairy; stem hairs spreading, 0.9–1.5 mm long. *Leaves* trifoliate; leaflets narrowly oblong to needle-shaped, 6.2–13.4 × 0.8–1.2 mm, base contracted abruptly to form a pseudopetiolute, apex acute to acuminate, 0.1–0.2 mm long, margins inrolled abaxially, entire; lamina chartaceous to rigid, 0.1–0.3 mm thick, midrib prominent abaxially against lamina, ± straight or curved upwards and towards stem, densely greyish hairy adaxially, hairs 0.4–1.7 mm long, densely whitish hairy abaxially, hairs 0.2–0.4 mm long, sheath 2.7–3.1 mm long, abaxially hairy, adaxially densely hairy; stipules 0.2–0.4 mm long, free, margins ciliate; petiole absent. *Flowers* solitary at base of undifferentiated leaves; bracteoles hairy; sepals 3, densely hairy abaxially. *Male flowers*: bracteoles 3.6–4.0 mm long; pedicel and receptacle 0.9–1.3 mm long; sepals broadly ovate, 5.0–5.8 × 1.8–2.3 mm, acute to acuminate at apex; stamens 9–11; filaments 4.6–5.7 mm long, red; anthers brownish red. *Female flowers*: bracteoles 2.8–4.8 mm long, longer than immature receptacle; sepals linear, 1.5–2.9 × 0.2–0.5 mm, erect; carpel 1; stigma 4.1–6.5 mm long, red, feathery, prominent above leaves; immature receptacle 1.6–2.2 × 0.7–0.9 mm, glabrous, clearly ribbed. *Achene* ellipsoid, 3.2–3.7 × 1.1–1.4 mm, pale greyish brown, glabrous; ribs 11–15, rounded to acute, less than 0.1 mm wide. *Flowering time*: January, although probably in the neighbouring months as well. Figure 10.

Diagnostic characters and affinities: this species is very similar in many respects to *Cliffortia eriocephalina* but differs on account of its longer, narrower, stiffer and pointed leaves. The leaves are similar in form to the unrelated lowland species, *C. stricta*, but are much more hairy and grey in appearance. *C. eriocephalina* and *C. weimarckii* grow sympatrically in some places such as Matroosberg, where they can be easily distinguished. However, some specimens from the Baviaansberg (*Stokoe 4537*, *Esterhuysen 29806*) and Cederberg Langberg (*Bond 1383*) have leaves of intermediate length, and without field observations on the populations, they are only tentatively attributed to this species.

Weimarck annotated some collections of this species indicating that he thought they were a new species. It therefore seems most appropriate to name this species in his honour, especially considering his immense contribution to our current understanding of the genus.

Habitat: high altitude mountain fynbos on well-drained acid sands from Table Mountain Series in full sun; altitude 1200–2250 m.

Distribution: Hex River Mtns and the highest peaks of the Koue Bokkeveld and Groot Winterhoek Mtns, possibly also Baviaansberg and Cederberg Langberg (see note above, Figure 4).

Conservation status: populations are scattered as it is restricted to such high altitudes, however it is therefore also not threatened, especially as it is a resprouter.

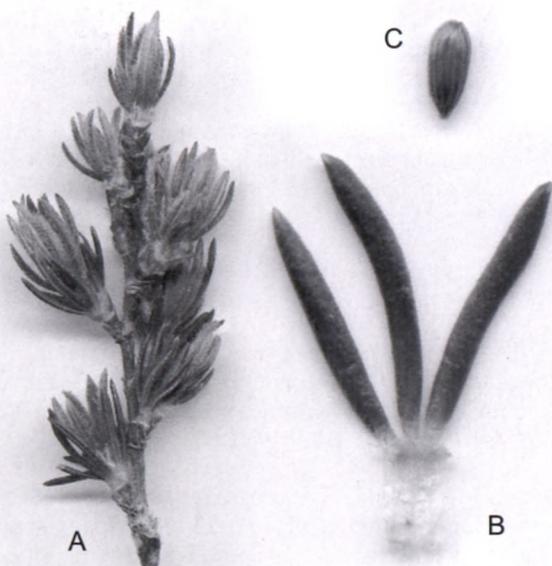


FIGURE 10.—*Cliffortia weimarckii*. A, branch, × 1; B, leaf, × 4; C, achene, × 4.

Etymology: *weimarckii* is named after Henning Weimarck who wrote the first full monograph of *Cliffortia*.

9. *Cliffortia cuneata* Dryand. in Aiton, Hortus kewensis, edn 1, 3: 413 (1789); DC.: 595 (1825); Weim.: 129, fig. 37A–F (1934); Fellingham: 609 (2000). Lectotype, designated by Weimarck (1934): Western Cape, 3418 (Simonstown): False Bay, *Robertson s.n.* (BM, holo!).

Medium to tall, erect shrub, up to 3 m high, killed by fire; densely divaricately branched, forming long branches and brachyblast when flowering; young stems 1.0–2.5 mm wide, glabrous or slightly hairy but quickly becoming glabrous; stem hairs adpressed upwards, 0.1–0.4 mm long. *Leaves* unifoliate; wedge-shaped to oblong, 13–41 × 4.9–13.9 mm, margins flat, only toothed at apex with 2–6 broad straight teeth, 0.6–2.9 mm long; lamina 3–7-veined from base, chartaceous, 0.1–0.6 mm thick, midrib very prominent abaxially, curved upwards and towards stem, slightly glaucous, glabrous; sheath 0.8–2.3 mm long, abaxially glabrous, adaxially hairy or glabrous except for fringe at apex; stipules 0.2–1.6 mm long, free, margins smooth; petiole absent. *Flowers* solitary at base of undifferentiated leaves but often clustered together; bracteoles hairy or glabrous on keel, margins smooth; sepals 3, glabrous. *Male flowers:* bracteoles 6.2–8.5 mm long; pedicel and receptacle 1.2–2.1 mm long; sepals broadly ovate, 6.6–10.3 × 4.0–5.9 mm, acute to acuminate at apex; stamens 27–36; filaments 11–14 mm long, red; anthers yellow. *Female flowers:* bracteoles 3.8–10.5 mm long, longer than immature receptacle; sepals ovate to obovate, 3.7–5.9 × 1.4–2.9 mm, erect; carpel 1; stigma 6.5–11.0 mm long, greenish white, feathery, prominent at base of the leaves; immature receptacle 1.9–5.2 × 1.2–2.9 mm, glabrous, smooth. *Achene* cylindrical to almost globose, 4.5–6.8 × 1.5–3.8 mm, medium to dark brown, glabrous; ribs 6 or 12–14, rounded, 0.1–0.8 mm wide.

Diagnostic characters and affinities: the reverse, long, almost triangular glaucous leaves, toothed only at the truncate apex, are very distinctive on this medium-sized species. This character is not only diagnostic but emphasizes the isolated position that this species holds within the genus as it has no close relatives.

However, while the typical form of the species has large, almost globose, achenes with numerous ribs, the achenes from the populations around Arieskraal are smaller, more cylindrical in shape, with only six low ribs. Furthermore, the leaves appear to be consistently

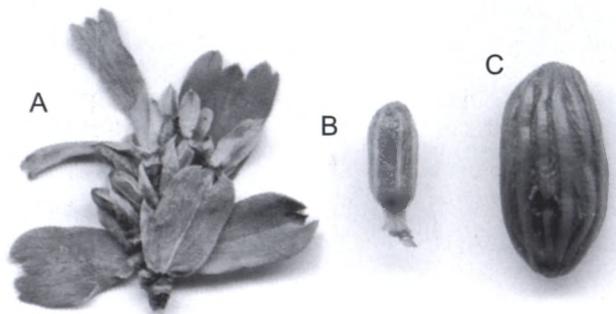


FIGURE 11.—*Cliffortia cuneata* var. *cylindrica*: A, branch with achenes, × 2; B, achene, × 4. *C. cuneata* var. *cuneata*: C, achene, × 4.

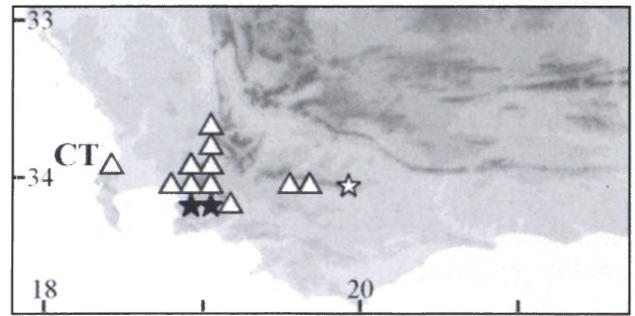


FIGURE 12.—Known distribution of *Cliffortia cuneata* var. *cuneata*, Δ; and *C. cuneata* var. *cylindrica*, ☆; *C. cuneata* var. *cuneata* and var. *cylindrica*, ★, in South Africa.

smaller, although still within the variation shown by the large-achened form of the species. This form is described here as a new variety.

The fruit is so distinct that specific rank was considered. However, as the number of specimens examined is still low, male flowers are unknown and a population near Riviersonderend was of questionable status, varietal rank was considered most appropriate for the present.

Etymology: *cuneata*, Latin for wedge-shaped or inversely triangular, referring to the distinctive shape of the leaves.

9a. var. *cuneata*

Leaves 16–41 × 5.4–13.9 mm, margins toothed at apex with 2–6 broad straight teeth, 0.9–2.9 mm long; lamina 3–7-veined from base. *Male flowers* as above. *Female flowers:* bracteoles 8.2–10.5 mm long; sepals ovate to obovate, 4.2–5.9 × 1.7–2.9 mm; immature receptacle 3.0–5.2 × 2.0–2.9 mm. *Achene* broadly ovoid to almost globose, 6.2–6.8 × 2.9–3.8 mm; ribs 12–14, rounded, 0.3–0.8 mm wide. *Flowering time:* June–December. Figure 11C.

Habitat: low slopes in fynbos on well-drained clayish shale soils in full sun; altitude 0–950 m.

Distribution: found on lower slopes between the Paarl side of Du Toit's Kloof, Helderberg and Houw Hoek, with an outlying population in Boesmanskloof in the Riviersonderend Mtns (Figure 12).

Conservation status: widespread but scattered localities of quite extensive populations, several within nature reserves; threats come from too frequent fires and invasive alien vegetation.

9b. var. *cylindrica* C. Whitehouse, var. nov., a var. *cuneata* acheniis subcylindricis sexcostatis differt.

TYPE.—Western Cape, 3418 (Simonstown): Caledon District, Arieskraal, south-facing slopes on Bokkeveld shale above Arieskraal Dam, 215 m, (–BB), 29 Nov. 2000, *Whitehouse 166* (BOL!; NBG!).

Leaves 13–23 × 4.9–7.5 mm, margins toothed at apex with 4 broad, straight teeth, 0.6–1.6 mm long; lamina 3–5-veined from base. *Male flowers* unknown. *Female flowers:* bracteoles 3.8–6.0 mm long; sepals narrowly ovate to linear, 3.7–4.1 × 1.4–2.0 mm; immature receptacle 1.9–3.4 × 1.2–1.4 mm. *Achene* cylindrical, 4.5–

5.0 × 1.5–1.7 mm; ribs 6, rounded, 0.1–0.3 mm wide. *Flowering time*: October–November. Figure 11A, B.

Habitat: fynbos on south-facing shale slopes of the Bokkeveld Series; altitude 250–400 m.

Distribution: only known from Arieskraal in the Kogelberg area, but possibly present near Riviersonderend (see note above, Figure 12).

Conservation status: known from only one or two very small populations in a very confined area much of which has already been converted to orchards because it grows on relatively fertile shale; the only population that the first author has seen is on a slope too steep to be used.

Etymology: *cylindrica*, Latin for cylindrical, referring to the shape of the ± straight-sided achenes in contrast with the typical variety, which are broadly ovate.

10. *Cliffortia filifolia* L.f., Supplementum plantarum: 430 (1782); DC.: 596 (1825); Weim.: 68, fig. 17J–N (1934); Levyns: 447 (1950); Fellingham: 615 (2000). Type: Western Cape, 3318 (Cape Town): Cape Peninsula, Table Mtn, E slopes, (–CD), *Thunberg s.n.* (LINNf, holo.; CP, LD, UPS-THUNB).

Low, often sprawling, shrub, up to 1 m high, killed by fire; densely divaricately branched, forming closely overlapping brachyblasts; young stems 0.5–1.0 mm wide, sometimes tinged reddish, glabrous. *Leaves* trifoliate; leaflets needle-shaped, 5.8–17.0 × 0.3–0.8 mm, apex sharply acuminate, 0.2–0.9 mm long, margins rounded, minutely serrulate to scabrid; lamina chartaceous, 0.2–0.4 mm thick, with two pale stripes on either side of midrib, glabrous; sheath 1.3–3.0 mm long, abaxially glabrous, adaxially glabrous except occasionally for a few hairs at apex; stipules 0.7–3.1 mm long, free, margins smooth to serrulate; petiole 0.2–2.0 mm long. *Flowers* solitary in axil of undifferentiated leaves; bracteoles gla-

brous on keel, margins smooth to serrate; sepals 3, glabrous. *Male flowers*: bracteoles 2.4–4.3 mm long; pedicel and receptacle 0.4–0.7 mm long, glabrous; sepals broadly ovate, 3.2–5.2 × 1.2–1.8 mm, acute to acuminate at apex; stamens 5 or 6; filaments 3.4–5.2 mm long, red; anthers yellow. *Female flowers*: bracteoles 2.5–4.4 mm long, longer than immature receptacle; sepals narrowly ovate to linear, 1.7–2.7 × 0.4–1.0 mm, erect to spreading; carpel 1; stigma 1.6–2.5 mm long, greenish white, feathery, hidden at base of leaves; immature receptacle 0.8–1.2 × 0.4–0.7 mm, glabrous, smooth. *Achene* ellipsoid to cylindrical, 2.8–5.2 × 1.2–1.7 mm, greyish to medium brown, covered by membranous layer, glabrous, obscurely ribbed; ribs 6–9, rounded, up to 0.1 mm wide.

Habitat: in the west it is found on shale bands of Table Mountain Series, but east of Cape Agulhas it is restricted to dune slacks; altitude 0–1 100 m.

Distribution: widespread though scattered from Piketberg to Knysna.

Conservation status: widespread though scattered, but no serious threats except possibly var. *arenaria*, which grows in areas subject to development.

Etymology: *filifolia*, Latin for thread-leaved, referring to the fine, needle-like leaves.

10a. var. *filifolia*

C. leptophylla Eckl. & Zeyh.: 270 (1836). Type: Western Cape, 3319 (Worcester): Caledon District, Houwhoek Mtn, near Knofflookskraal, (–AA), July, *Ecklon & Zeyher 1752* (B†, CP, G-DEL, K!, L, PRE, UPS, S, W, Z).

Young stems 0.6–1.0 mm wide. *Leaflets* 6.1–17.0 × 0.4–0.8 mm, apex 0.2–0.9 mm long; lamina 0.2–0.4 mm thick, curved upwards and towards stem; sheath 1.3–3.0 mm long; stipules 0.7–3.1 mm long; petiole 0.2–2.0 mm long. *Female flowers*: bracteoles 2.5–4.4 mm long; sepals 1.7–2.7 × 0.4–1.0 mm, erect to spreading; carpel 1; stigma 1.6–2.5 mm long, greenish white, feathery,

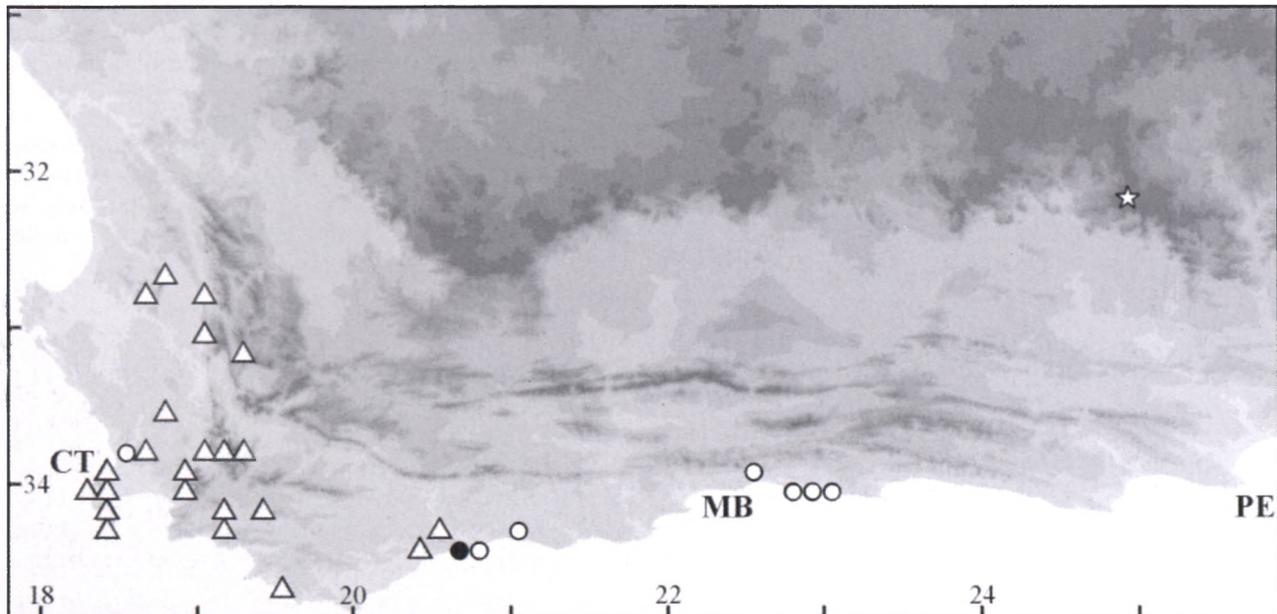


FIGURE 13.—Known distribution of *Cliffortia filifolia* var. *filifolia*, Δ ; and *C. filifolia* var. *arenaria*, \circ ; *C. filifolia* var. *arenaria* and var. *filifolia*, \bullet ; and *C. bolusii*, \star , in South Africa.

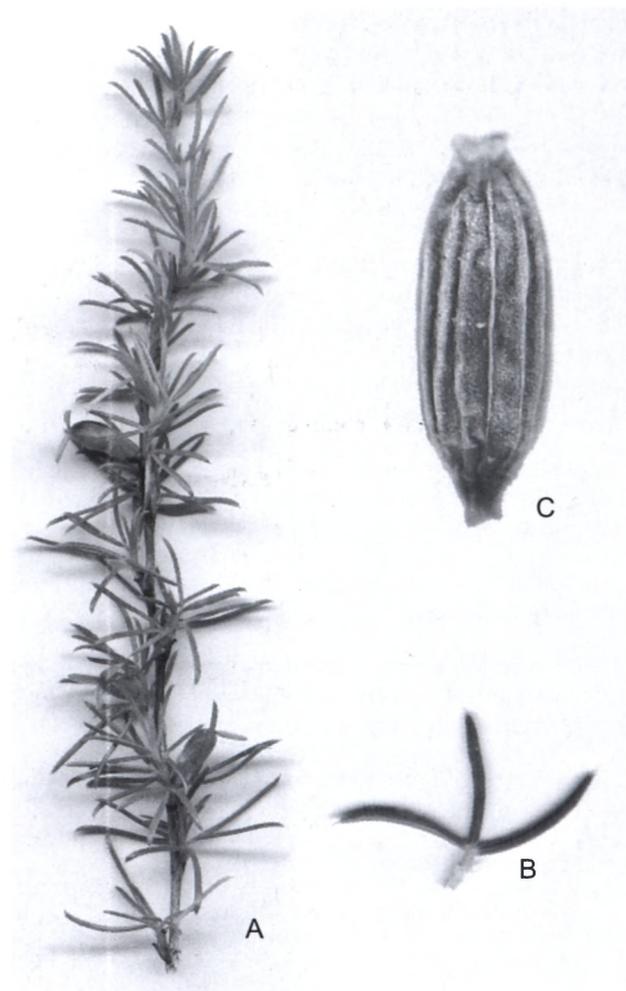


FIGURE 14.—*Cliffortia filifolia* var. *arenaria*. A, branch with achenes, $\times 2$; B, leaf, $\times 3$; C, achene, $\times 10$.

hidden at base of leaves; immature receptacle 0.8–1.2 \times 0.4–0.7 mm. *Achene* 2.8–4.4 \times 1.2–1.6 mm. *Flowering time*: May–September.

Habitat: well-drained soils on shale bands of Table Mountain Series rocks in full sun; altitude 0–1100 m.

Distribution: common but scattered on the lower slopes of mountains from Piketberg in the north to Caledon Swartberg in the south, including the Cape Peninsula, with an outlying population on the Potberg in De Hoop Nature Reserve (Figure 13).

10b. var. *arenaria* C. Whitehouse, var. nov., a varietate typica foliis plerumque brevioribus saepe deorsum curvatis differt.

TYPE.—Western Cape, 3422 (Mossel Bay): George District, sand dunes E of Wilderness, (–BA), 3 Dec. 1951, *Esterhuysen 19336* (BOL!; NBG!, PRE!).

Young stems 0.5–0.6 mm wide. *Leaflets* 5.8–6.6 \times 0.3–0.6 mm, apex 0.1–0.3 mm long; lamina 0.2–0.3 mm thick, often curved downwards and away from stem; sheath 0.6–1.1 mm long; stipules 0.7–1.0 mm long; petiole 0.3–0.5 mm long. *Female flowers*: bracteoles 2.5–2.8 mm long; sepals 2.3–2.5 \times 0.6–0.8 mm. *Achene* 4.7–5.2 \times 1.6–1.7 mm. *Flowering time*: March to August. Figure 14.

Diagnostic characters and affinities: *Cliffortia filifolia* is relatively distinctive amongst the numerous needle-leaved species of *Cliffortia*. The presence of a short petiole along with the fine leaflets is diagnostic. However, within *C. filifolia*, there appear to be two distinct ecotypes. The western variety, var. *filifolia*, has longer leaflets, which curve upwards towards the stem. This variety generally occurs on clayish soils derived from sandstones of the Table Mountain Series. The eastern variety described here, var. *arenaria*, is distinguished by its shorter leaflets, which often curve in directions away from the stem. It is almost entirely restricted to sandy coastal areas, especially dune slacks. In the southern Overberg [3419, Caledon District, Waterford Farm, (–DA), *Whitehouse 222*] and Cape Flats [3318, Cape Town, Penhill, (–DC), *Helme 1594*], the distinction between the two varieties and their habitats is less clear, otherwise species status might have been considered more appropriate.

Habitat: wind-blown sand of dune slacks in full sun; altitude 0–250 m.

Distribution: coastal areas from De Hoop Nature Reserve as far as Knysna, with a possible record from the sandplains of the Cape Flats (Figure 13).

Etymology: *arenaria*, Latin meaning growing on sand, referring to the fact that it is found growing in dune slacks.

11. *Cliffortia bolusii* Diels ex C. Whitehouse, sp. nov., a congeneribus stipulis nullis foliis oblongis 3–7 mm longis planis apicibus rotundatis distinguitur.

TYPE.—Eastern Cape, 3224 (Graaff-Reinet): Graaff-Reinet District, Nardouwsberg, (–BB), Apr. 1873, *Bolus 2630* (BOL, holo.; B†).

C. sp. 1 sensu Weim.: 158 (1934).

Illustration: Weim.: fig. 47A (1934).

Shrub, densely divaricately branched, forming brachyblasts; young stems hairy; stem hairs spreading to curled. *Leaves* trifoliolate; leaflets elliptic to oblong, 3–7 \times 0.6–0.8 mm, apex mucronate to rounded, margins flat, entire and smooth; lamina chartaceous, straight to curved downwards and away from stem, hairy adaxially and abaxially; sheath 1.5–3.0 mm long, abaxially hairy, adaxially glabrous except for fringe of hairs at apex; stipules absent; petiole absent. *Flowers* unknown but solitary bracteoles found at base of undifferentiated leaves; bracteoles hairy. Figure 15.

Diagnostic characters and affinities: the species has no clear affinities. The leaves bear a resemblance to a trifoliolate version of *Cliffortia dichotoma* Fellingham, but are more rounded at the apex. Apart from its isolated geographic locality there is no further reason to suggest that it belongs to section *Arborea*. A solitary hairy bracteole was found in a leaf axil, but this does not reveal any significant systematic information about the species.

Weimarck refrained from naming this species until more information was available, although he realised that it was distinctive both taxonomically and biogeographically.

graphically. Seventy years on from his monograph, no further collections have been made, but the trifoliate leaves, lacking stipules, with flat oblong leaflets, are diagnostic. Furthermore, it is important to recognize the taxon formally to encourage further searches for the species and to ensure that it is included in conservation assessments for the area.

Habitat: unknown, although the mountain is generally montane grassland with rocky outcrops and dolerite cliffs; altitude 1 700–1 800 m (but see note below).

Distribution: known only from a single collection made on the Nardouwsberg near Graaff-Reinet (Figure 13).

Conservation status: not been collected since it was first collected in 1873, though the Nardouwsberg is a large mountain and it may still exist on some rocky outcrops. The Nardouwsberg is subject to grazing and burning, making the chance of this species surviving away from the protection of rocks unlikely.

Etymology: *bolusii* is named after Harry Bolus, founder of the Bolus Herbarium at the University of Cape Town and the only person to have ever collected this species.

A very poorly known species with only a single surviving fragment remaining of a collection made over 100 years ago. Unfortunately Bolus's notes describing his collecting trip to the Nardouwsberg were lost in a shipwreck, as probably were further specimens account-

ing for the paucity of the remaining fragment at BOL. (The other specimen seen by Weimarck was at B and is presumably now destroyed.) More accurate information on where he collected is therefore unavailable. A cursory search of the mountain did not reveal this species, but three other species were found: *Cliffortia eriocephalina*, *C. montana* and *C. ramosissima*.

The name *bolusii* is written on the herbarium sheet at BOL and attributed to Diels, though he never published it. Although the altitude is given as 5800 ft (\pm 1770 m), this is also the altitude given for Bolus's specimen of *C. eriocephalina* (Bolus 851) from the same locality. However, on the recent trip to the Nardouwsberg, *C. eriocephalina* was only seen just below the summit, an altitude of \pm 2300 m.

12. *Cliffortia odorata* L.f., Supplementum plantarum: 431 (1782); Weim.: 152, fig. 45A–E (1934); Levyns: 450 (1950); Fellingham: 610 (2000).

TYPE.—South Africa, without precise locality, 'Cape of Good Hope', *Thunberg s.n.* (LINNf, holo.; CP, UPS-THUNB).

C. discolor Weim.: 202, fig. 16d–f (1948); Fellingham: 609 (2000), syn. nov. Type: Western Cape, 3318 (Cape Town): Cape Peninsula, Table Mtn, 1000 m, (–CD), Nov. 1884, *Marloth 360* (PRE, holo.).

Cliffortia discolor was described by Weimarck based on a specimen from Table Mtn with very dense white hairs on the underside of the leaves. However, field observations of this well-explored locality reveal a continuous range of variation typical of *C. odorata*. Specimens of *C. odorata* at higher altitudes are often more densely hairy, especially beneath, and have smaller, rounder leaves. This is probably a result of increased exposure and as no further specimens have ever been attributed to *C. discolor*, the name is here reduced to synonymy of *C. odorata*.

13. *Cliffortia juniperina* L.f., Supplementum plantarum: 430 (1782); Weim.: 57, fig. 14A–E (1934); Fellingham: 615 (2000). Type: South Africa, without precise locality, *Sparrman s.n.* (LINNf, holo.).

C. hermaphroditica Weim.: 172, fig. 2a–c, t. 4 (1948); Fellingham: 612 (2000), syn. nov. Type: Western Cape, 3318 (Cape Town): Stellenbosch District, Jonkershoek, (–DD), 4 Nov. 1943, *Compton 15332* (NBG, holo.).

The identification of *Cliffortia hermaphroditica* is difficult as the specimen of *Compton 15332* supposedly deposited at NBG has not been found. Two other specimens of the same collection have been seen at BOL and PRE and both belong to a form of *C. juniperina* with close acute ribs. Weimarck placed the BOL specimen in his concept of *C. juniperina* var. *pilosula* on account of its hairy stems. The photograph in Weimarck l.c., t. 4 (1948) does nothing to suggest that the type was anything other than a slightly abnormal specimen of *C. juniperina*. Certainly the type locality has been very well collected and nothing else similar has been found, indicating further that it was an atypical form, possibly of hybrid origin, that arose once and has since disappeared.

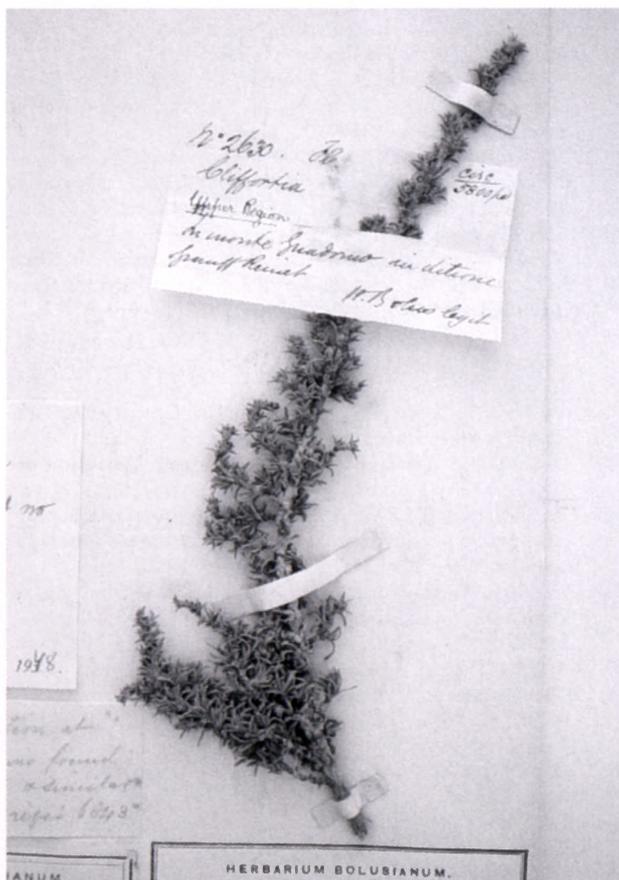


FIGURE 15.—Type specimen of *Cliffortia bolusii*.

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SPECIMENS EXAMINED

Acocks 16102 (9a) BOL, K; 21529, 22531 (10b) K, PRE; 22426 (10a) K, PRE. *Acocks & Hafstrom* 568 (10a) PRE. *Andreae s.n.* (4a) BOL; 1154 (8) NBG, PRE.

Barker 4583 (10a) NBG; 5950 (9a) NBG. *Bean, Vlok & Viviers* 2096 (5) NBG, PRE. *Berg STE19824* (4a) NBG. *Beyers* 214 (9a) NBG, PRE. *A. Bolus* 1545 (4a) BOL. *F & L. Bolus* 13310 (10a) BOL. *H. Bolus* 2630 (11) BOL; 4017 (10a) BOL, K; 6994 (9a) BOL, NBG, PRE; 7987 (4a) BOL, K; 11271 (5) BOL, PRE. *Bond* 727 (9a) NBG. *Bosenberg & Rutherford* 337 (1) NBG. *Boucher* 1749 (9b) NBG. *Boucher & Shepherd* 4359 (10a) NBG. *Boucher & Stindt* 5282 (10a) NBG. *Bousse s.n.* (9a) BM. *Burchell* 5583 (10b) K; 7816 (9a) K. *Burgers* 1947 (10a) NBG, PRE. *Burke s.n.* (10a) K. *Buyts* 64 (9a) NBG.

Compton 6408, 8151, 9219, 16534 (7) NBG; 8359, 15301, 18324 (9a) NBG; 15828 (10b) BOL, NBG; 16471 (9b) NBG; 17090 (10a) NBG; 17451, 18546 (4a) NBG; 20120 (4b) NBG. *Cowling* 178 (10b) GRA.

De Villiers s.n. (9a) NBG. *Drège s.n.* (9a) K; *s.n.* (4b) K; *a* (9a) BM. *Dryfhout* 1557 (9a) NBG. *Duthie* 957 (9a) BOL.

Ecklon 1751, 1752 (10a) K. *Esterhuysen s.n., 1993, 11968, 33622, 33625* (4a) BOL; *s.n., 1992* (9a) BOL; 121 (4a) PRE; 2647 (4a) BOL, K, NBG, PRE; 8312 (8) BOL, K, PRE; 9296, 9368, 9920, 13782, 14183, 14280, 14722, 14832, 14891, 14946, 27575, 27688, 27772, 28090 (8) BOL; 10100, 15242 (4a) BOL, PRE; 11636, 11857, 11947, 14501, 16185, 31353 (10a) BOL; 11658 (10a) BOL, PRE; 12813 (4b) BOL; 14062 (4b) BOL, K; 14499, 15325 (10a) BOL, NBG; 14647 (4a) BOL, NBG; 15745 (10a) BOL, NBG, PRE; 19336 (10b) BOL, NBG, PRE; 27765 (5) BOL; 29401 (10b) BOL; 30602 (1) BOL, K, NBG, PRE.

Fellingham 655 (10a) NBG, PRE; 1056 (10a) NBG; 1529 (1) BOL, K, NBG, PRE; 1530, 1545, 1546, 1582, 1613, 1626, 1634, 1635 (1) BOL, NBG, PRE; 1551, 1597, 1601 (1) NBG; 1623 (1) NBG, PRE; 1695 (1) BOL, NBG. *Froembling s.n.* (4a) NBG; *s.n.* (10a) NBG.

Galpin 4002 (5) BOL, PRE. *Gamble* 22232 (10a) K. *Garside* 1025 (9a) K. *Gillett* 712, 1802 (9a) NBG. *Goulimis s.n.* (10a) BOL. *Guthrie* 35 (10a) BOL; 2348 (9a) NBG.

Haynes 692 (4a) K, NBG, PRE; 1148 (9a) NBG, PRE. *Helme* 1594 (10b) NBG; 2939 (3) NBG; 3970 (1) NBG; 3973 (6) NBG. *Herb. Goodenough s.n.* (9a) K. *Hort. Kew s.n.* (9a) BM. *Hubbard* 176, 396 (9a) NBG. *Humbert* 9436, 9663 (10a) PRE.

Keet STE13379 (10b) NBG; 725 (10b) GRA, PRE. *Kerfoot* 5412 (9a) NBG; 5705 (4a) PRE; 6021 (4a) K, NBG, PRE.

Leighton 460 (10a) BOL; 792 (9b) BOL. *Levy's* 2707 (5) BOL; 3364, 3919, 7284, 8500, 11406 (9a) BOL; 5322 (10a) BOL; 5329 (10a) BOL, PRE; 7890, 9155, 10262, 10313, 10345 (10b) BOL.

Maguire 1067 (7) NBG. *Marloth* 2250 (8) PRE; 4241 (8) NBG; 4341 (4a) PRE. *McDonald* 651 (4a) K, NBG, PRE. *Morley* 8 (10b) NBG, PRE.

O'Callaghan, Fellingham & Van Wyk 105 (10b) NBG, PRE.

Page s.n. (10a) BOL, GRA. *Palmer* 78 (10a) NBG. *Pappe* 11 (9a) BM. *Parker* 3489 (4a) BOL, K, NBG; 3616, 4281 (9a) BOL, K, NBG. *Penfold* 32 (10a) NBG. *Pillans s.n., 8422* (9a) BOL; 7570 (10a) BOL. *Prior s.n.* (4a) K, PRE; *s.n.* (9a) K; *s.n.* (10a) K, PRE.

Robertson s.n. (9a) BM. *Rodin* 3266 (9a) BOL, K, PRE. *Rogers* 29245 (9a) BOL, K, PRE. *Runnalls* 587 (9a) NBG, PRE; 587a (9a) NBG. *Rycroft* 3209, 3284, 3318 (9a) NBG.

Schlechter 798 (9a) BOL; 2203 (5) K, NBG, PRE; 7558 (9a) BM, K, NBG, PRE. *Schoeman s.n.* (9a) NBG. *Sieber* 508 (10a) K. *Stauffer* 5022 (10a) K, NBG, PRE. *Stokoe SAM59213* (4a) NBG, PRE; *SAM61481* (9a) PRE; 8619 (9a) BOL, PRE; 8835 (8) BOL.

Taylor 6365 (10a) NBG, PRE; 6370 (10a) K, NBG, PRE; 6529 (10a) BOL, K, NBG, PRE; 6851 (10a) BOL, NBG, PRE; 6905 (9a) NBG, PRE. *Thode* 6174 (4a) NBG; 9181 (4a) NBG. *Thompson* 176 (3) NBG, PRE; 994 (4a) K, NBG, PRE.

Van der Merwe 844 (9a) NBG, PRE. *Van Jaarsveld & Sardien* 7686 (9b) NBG. *Van Rensburg* 469 (9a) NBG; *SKF2033* (9a) K, PRE. *Van Wyk* 1911 (10b) NBG, PRE.

Wallich s.n. (10a) K. *Werdermann & Oberdieck* 367, 743 (9a) K, PRE. *C. Whitehouse* 14 (4a) BOL, K, NBG; 21 (9a) BOL, NBG; 34 (4a) BOL, NBG; 54, 111 (10a) BOL, NBG; 98 (5) BOL, NBG; 119 (6) BOL; 137 (2) BOL, K, MO, NBG, Z; 145 (3) BOL, NBG; 151 (9a) BOL; 166, 282 (9b) BOL, NBG; 187 (8) BOL, NBG; 219 (1) BOL, K, NBG, Z; 222 (10a) BOL; 283 (7) BOL, NBG. *C. & A. Whitehouse* 149 (9a) BOL, K, NBG; 215 (10a) BOL; 245 (9a) BOL, NBG; 257 (6) BOL, NBG; 259 (6) BOL, K, NBG; 304 (10a) BOL, NBG; 318 (10b) BOL, NBG; 329 (3) BOL, NBG; 331 (7) BOL. *Wilms* 3182 (4a) K. *Wolley Dod* 1072 (10a) K; 2637 (4a) BOL, K. *Wright s.n.* (10a) K.

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